AGRICULTURE

KITCHEN UNITS for the CLASSROOM

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KITCHEN UNITS FOR THE CLASSROOM

This study is concerned with functional standards for storage of equipment, use of space, and arrangement of work centers in kitchen units for four students within a high school foods laboratory.

A classroom unit kitchen that is planned for efficient storage and use of equipment and food supplies will encourage students in high school homemaking classes to learn and use good management techniques in preparing food. Good management is a homemaking skill that can make a significant contribution to good family living. Since class periods are usually only 50 or 60 minutes long, efficient management is also important in the classroom if students and teacher are to make the best use of the limited time.

Orderliness and ease of work are of first consideration in efficient management. Well-designed work units save time and confusion by relieving congestion and reducing wasted steps and motions. The overall result is more effective teaching and a more satisfying experience in food preparation.[1]

The Classroom Unit Kitchen and the Home Kitchen

Space requirements and the arrangement of a kitchen area are considerably influenced by the number using the area — for example, the more people working in a kitchen, the more counter space is needed. Planning standards have already been established for home kitchens, but not all of these are applicable to classroom units. The home kitchen is ordinarily used by only one or two persons, whereas the classroom unit should permit as many as four students[2] to work at one time without congestion, interference, or cross-traffic. The classroom work pattern also differs from that of the home kitchen — sometimes all four students may prepare the same item of food; at other times, each may prepare a different food as part of a complete meal.

The classroom unit also differs from the home kitchen in equipment. Duplication of some utensils is necessary or desirable in the classroom kitchen because more people work in it at the same time. On the other hand, fewer types of utensils and food supplies are needed in the school unit because food preparation is not a three-times-a-day proposition as it is in the home. As a result, less storage space is needed in the classroom unit. (The duplication is not extensive enough to influence total storage requirements.)

A four-burner range and a double-bowl sink are the only major items of equipment suggested for each of the classroom units. In the home kitchen the refrigerator is also a basic item of equipment within the work area proper. However, since the refrigerator serves a limited purpose in a teaching program, it is not included in the individual units. One or more refrigerators can be in the laboratory, easily accessible to all unit kitchens.

If counter-top cooking-units are selected instead of ranges, separate ovens may be installed in the main area of the foods laboratory instead of within the unit kitchens. Frequent trips to the oven are unnecessary, so one oven can serve several units.

Garbage disposals and dishwashers are not recommended for each unit because of use and maintenance problems. They can, however, be included in some of the unit kitchens for demonstration purposes. The floor plans shown in this publication can easily be adapted to accommodate this equipment.

The question of whether the classroom kitchen should give the appearance of a laboratory or of a home-like kitchen was not within the scope of this project. Either type can be developed from the standards given.

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[1] "Equipment That Equips for Teaching Management," Mildred Moore, *Practical Home Economics*, Vol. 30, No. 4 (April, 1952); "Functional Storage in the Unit Kitchen," Mildred Moore, *Practical Home Economics*, Vol. 30, No. 5 (May, 1952).

[2] Four students are considered an effective number for each unit for the following reasons: 1) duties can be well distributed among four students; 2) each student can complete her share of the work within the classroom period; 3) each student gets sufficient individual experience; 4) the opportunity for cooperation is adequate; and 5) the group of four is equivalent, in number, to a typical family. (Adapted from *Opinions of Home Economics Leaders Concerning Locating, Arranging and Equipping Homemaking Departments*, Justine O'Reilly, master's thesis, Oregon State College, 1942.)

RESEARCH PROCEDURE

To establish functional standards for efficient kitchen units suitable for use by four high school homemaking students, the following information was needed:

- Utensils, foods, supplies (such as cleaning materials), and equipment required to prepare individual food items and entire meals.
- The amount of space needed for the storage of the utensils, foods, and supplies.
- The counter space needed by each student in the preparation of individual foods and meals.
- The arrangements of equipment, and work and storage areas that make good work procedures possible.
- The total amount of floor space required.

To obtain this information, 1) related literature was reviewed and evaluated; 2) a preliminary motion-time study was made, using the homemaking facilities of the Urbana High School; and 3) controlled motion-time studies were conducted in three experimental kitchen units set up in a University of Illinois home economics laboratory, and flow charts showing traffic patterns were made. The three experimental kitchens were L, U, and box-U in shape, with movable storage cabinets designed and built according to standards developed by Helen E. McCullough. (See pages 14 to 16 for floor plans of the kitchens.)

For both the preliminary and the controlled studies, eight homemaking students in the ninth and tenth grades cooperated in preparing a family meal and an individual food item, and motion-time studies were made.

The complete meal consisted of cubed steak, mashed potatoes, buttered carrots, tossed salad, ready-to-mix cupcakes, and fruit cocktail. Bread and butter were served but not prepared by the students. The individual food-preparation problem was a lemon meringue pie. These foods were selected because they involved the use of 1) the three work centers, 2) the various major food-preparation operations — beating, stirring, rolling, and mixing, and 3) a representative number of utensils, food supplies, and equipment.

A part of the test was to determine the adequacy of the equipment listed on the next two pages. Data on the use of serving facilities were not compiled because such facilities are not an integral part of the food-preparation units.

Recommendations, based on this study and other kitchen research, are presented in this report as a guide for high school homemaking educators, school administrators, school board members, architects for schools, and manufacturers.

Recorders tabulate motion-time data during a meal-preparation assignment in the box-U experimental kitchen unit.

UTENSILS AND SUPPLIES

A generally accepted list of utensils, tableware, linens, cleaning supplies, and food items needed to furnish an efficient kitchen for four students is given below.[1] The list does not include one-of-a-kind utensils, such as a food grinder, ordinarily kept at the distributing center in the main area of the food laboratory. Only basic food supplies are included, although other items will undoubtedly be needed, varying with class assignments. To lessen confusion, it is suggested that food supplies not stored within the units — for instance, refrigerated foods — be placed in advance on trays on the counters of the unit kitchens rather than be distributed at the supply center.

Duplication of some of the most frequently used items of equipment is essential to eliminate unnecessary steps and needless waiting and congestion. The items that should be duplicated are determined by 1) the number of places in the kitchen where the utensils are used first, and 2) the number of students who may wish to use the utensil at the same time.

All items stored at the mix center should be fully duplicated in kitchen units having the recommended two mix centers (pages 8 and 10). Some duplicate items — measuring cups, for example — are also desirable at the sink and the range centers.

The cost of duplicating utensils is extremely small compared with the alternative cost of providing additional kitchen units as a means of relieving congestion and minimizing time loss.

[1] List adapted from *Space and Equipment for Homemaking Programs,* Alta Lee, Federal Security Agency, Office of Education, Division of Vocational Education, Washington, D.C., Miscellaneous 9 (1950).

Utensils for Each Classroom Unit Kitchen

(Grouped according to general type and use)

2 double boilers
upper, 2 quarts
lower, 3 quarts
1 saucepan, 1 pint, with lid
1 saucepan, 1½ pints or 1 quart, with lid
1 saucepan, 2 quarts, with lid
1 saucepan, 2½ quarts, with lid
1 skillet, 9″ or 10″, with lid
1 pressure pan (different make for each unit)
1 chicken fryer or similar covered utensil
2 casseroles, 1½ quarts, with pie-plate lids
1 coffee maker (different kind for each unit)
2 bread pans, 9″ x 5″ x 2½″
2 rolling pins
2 pastry canvases
2 biscuit cutters, 1½″
2 cookie cutters, 3¼″
2 muffin pans
2 cookie sheets, 10″ x 14″
2 loaf cake pans, heatproof glass, 9″ x 9″ x 2½″
2 layer cake pans, 8″
2 pie pans, 8″ or 9″
2 cooling racks, 11″ x 11″
8 custard cups
3 mixing bowls, 1 quart
3 mixing bowls, 2 quarts
3 mixing bowls, 3 quarts
2 sifters, 2¼ to 2½ cups
2 pastry blenders (or 1 blender and 1 blending fork)
2 rotary egg beaters
4 scoops for flour, sugar
1 measuring cup, 1 pint, glass
3 measuring cups, ½ pint, glass
4 sets of 4 measuring cups, 1, ½, ⅓ and ¼ cup
4 sets measuring spoons
3 wooden spoons
3 rubber scrapers
4 tablespoons
4 teaspoons
2 paring knives, 2½″ blade
2 paring knives, 4″ blade
1 slicing knife, 8″ blade
3 case forks
1 meat fork, long, 2-tined
2 spatulas, 4″ blade
2 spatulas, 7″ blade
1 spatula, wide
1 vegetable peeler
1 scissors
1 tongs
2 cutting boards, 9″ to 12″ wide
1 potato masher
1 strainer, 5″
2 refrigerator dishes
2 graters
2 lemon reamers
2 sets salt and pepper shakers
Toothpicks or cake tester
1 can/bottle opener
2 trays, 12″ x 15″ x ½″
1 vegetable brush
1 sink strainer
2 rolls waxed paper
Plastic storage bags, 3 sizes

Tableware for Each Classroom Unit Kitchen

China

6 dinner/luncheon plates
6 salad plates
6 bread-and-butter plates
6 cups and saucers
6 cereal dishes
1 platter
2 vegetable dishes
1 creamer and sugar bowl
1 set salt and pepper shakers
2 relish or jelly dishes

Glass

12 tumblers
6 underliners
6 juice glasses
6 sherbets
1 pitcher

Silver

6 knives
6 forks
12 teaspoons
6 salad forks
3 tablespoons
1 butter knife

Linens and Similar Articles

2 dishcloths
6 dish towels
4 to 6 pan holders
12 place mats (two sets of 6)
6 cloth napkins
1 package paper napkins

Cleaning Supplies for Each Unit

1 garbage container and liners
1 package paper towels
1 scouring pad
1 cake soap
1 box detergent
1 box cleanser
1 can drain powder

Basic Food Supplies for Each Unit

1 to 10 pounds flour
1 to 5 pounds sugar
1 pound or less salt
½ pound or less cocoa
1 to 3 pounds shortening, if feasible
1 can baking powder
1 box pepper
3 to 5 cans spices
1 box soda
1 bottle vanilla extract

Heavy or large utensils are easily accessible when filed in a deep drawer having vertical dividers.

Shallow drawers fitted with dividers are recommended for storage of small utensils.

STORAGE PRINCIPLES[1]

Utensils, foods, tableware, linens, and cleaning supplies should be stored nearest the place where they are most likely to be used first — for instance, the strainer should be near the sink. When four students are working in a single kitchen unit, this principle of storage at the point of first use is highly important in saving time and steps.

Recommended storage locations for the various items listed on pages 5 and 6 are included in the descriptions of the various work centers given on the following pages. The descriptions also include recommended dimensions for cabinets and counters.

A second general principle of functional storage is that *items should be placed so that they are easy to see, reach, and grasp.* Some recommendations that will help to achieve this objective include:

- Stack articles only if they are the same size and shape.
- Store articles of different sizes and shapes one row deep and one stack high on shelves, and one layer deep in drawers.
- Store articles that are identical in size and shape, or those that are used only occasionally, two or more rows deep on shelves.
- Equip wall cabinets with adjustable shelves. The top shelf should not be higher than 72 inches from the floor.
- Use step-up shelves, racks, vertical dividers and files, and similar accessories to make items easily accessible and to utilize space advantageously.
- Store the heaviest and most frequently used articles within comfortable reach.

The need for functional storage in the classroom kitchen cannot be overemphasized. Such storage conserves time and energy by reducing needless reaching, stooping, and walking, as well as the rehandling of items.

Specific recommendations for efficient storage in classroom kitchen units include:

- *Store the most frequently used small utensils* (measuring cups, mixing spoons, bowl scrapers, etc.) *in the top drawers of base cabinets* to reduce the amount of stooping and bending on the part of the students.
- *Use vertical dividers for the top drawers of base cabinets* to facilitate removal and replacing of items.
- *Use vertical dividers in deep drawers* for storage of baking equipment (at the mix center), top-of-stove cooking equipment (at the range center), and trays and cutting boards (at the sink center). Such file drawers eliminate the stacking of unlike items, making it easy for students to remove and replace equipment.
- *Provide shallow drawers or trays* for storage of dish towels and dishcloths, place mats, paper napkins, and table linen to avoid stacking unlike items.
- *Assign each piece of equipment to an exact spot* by means of labels within drawers and cabinets. Orderliness is particularly essential when equipment is used by several persons.

In base cabinets, drawers are more functional than shelves. Pull-out or sliding shelves are more functional than stationary ones. Students can secure and replace items with fewer motions when drawers are provided. Space is also used to better advantage. If drawer storage is to be effective, however, the recommended dimensions, especially the inside height, must be used.

[1] Adapted from *Functional Kitchen Storage* (1948) and *Kitchen Cupboards That Simplify Storage* (1947), Mary Koll Heiner and Helen E. McCullough, New York (Cornell University) Station Bulletins.

WORK CENTERS

As an aid to achieving workable designs, kitchens are planned in terms of work centers. Home economists have named these the "mix," "sink," and "range" centers, according to the major activity conducted in the area, or according to the piece of equipment around which storage cabinets and counters are planned.

For efficiency, each kitchen unit designed for use by four students should have:

Two mix centers[1]
One sink center with a double-bowl sink
and
One range center with a four-burner range

The mix center has the heaviest use. Congestion and interference result when four students try to secure mixing bowls, measuring cups, and other utensils from one storage area at the same time. Unnecessary cross-traffic and interference occur when four people try to work at the same counter. Two mix centers, instead of one, will reduce this confusion and save time.

While congestion occasionally occurs at the sink center, this can be lessened by providing a minimum of 18 inches of counter on both sides of the double-bowl sink. The congestion at the sink is not sufficient to warrant the recommendation of two sink centers.

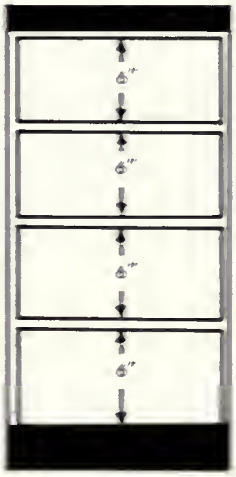
The range center receives the lightest use and little congestion should occur there.

Book and Purse Storage

Not included in the work centers, but essential in the classroom foods laboratory, is a storage place for students' purses, books, notebooks and recipe files. It is recommended that each kitchen unit have a four-drawer cabinet for this purpose, to reduce congestion and time loss at the beginning and end of a class period. The best location for this cabinet is at the end of the U or L. The cabinet, 18 inches wide, provides additional counter.

[1] See page 3 for explanation of why a refrigerator is not included in the mix center of the classroom kitchen.

BOOK STORAGE



Cabinets

Factory-made cabinets are suitable for the unit kitchens if they meet recommended dimension requirements and have the necessary drawers and pull-out counters. Wall cabinets should have adjustable shelving. (See illustrations, pages 10, 11, and 12 for dimensions and design of cabinets.)

In installing cabinets, a clearance of 15 inches should be allowed between the top of the base cabinets (the counter) and the bottom of the wall cabinets.

Standard over-all measurements for cabinets are:

Depth (front-to-back dimension): Base cabinets, 24 inches; wall cabinets, 12 inches.

Height: Base cabinets, 36 inches; wall cabinets, 30 to 36 inches.

Width: Since most schools have to conserve floor space, cabinet widths used in the unit kitchens are the minimum that efficiency of storage and work permits. The recommended widths are less than those recommended for home kitchens since fewer items need to be stored.[1]

Counters

Adequate space must be provided at each center so that two students can work comfortably side by side. This space requirement is 60 inches, or 30 inches per student.[2]

The counters on standard base cabinets are a satisfactory height (36 inches from the floor) for tall and average-height students, but short students need lower counters to enable them to work without fatigue. This lower work surface can be obtained by installing pull-out counter shelves in the base cabinets. Specific locations and heights of these are:

Right-hand cabinet of the sink center: One pull-out counter, 32 inches from the floor.

Each of the 24-inch base cabinets in the mix center: One pull-out counter, 30 inches from the floor.

Apron Drawer

Each unit kitchen should provide storage for aprons to lessen the confusion at beginning and end of class. A deep, ventilated drawer with rods for hanging the aprons is suggested for this purpose. The drawer can be incorporated into the 24-inch base cabinet of one of the two mix centers, preferably the center that is closest to the book cabinet. A ventilated drawer is superior to a shallow drawer where folded aprons could become badly wrinkled if put away damp.

Drawer space for apron storage may be unnecessary in foods laboratories where aprons are laundered after each wearing.

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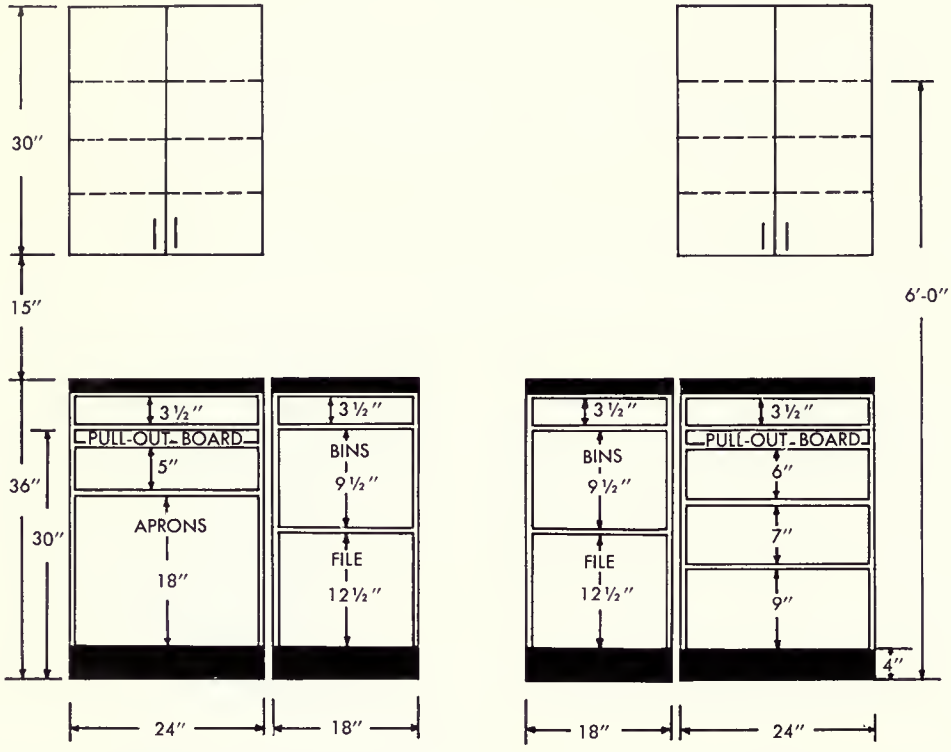
[1] *Cabinet Space for the Kitchen,* Helen E. McCullough, Small Homes Council Circular C5.31, University of Illinois (1949).

[2] *Dimension Standards for a High School Foods Laboratory,* Isabel D. Anderson, master's thesis, Oregon State College (1941).

Mix Centers

Each of the two mix centers to be used in the unit kitchen should be designed to permit two students to work with ease. This means that a minimum of 30 inches of counter space must be provided for each student, or a total of 60 inches for each mix center. Since only two base cabinets — an 18-inch and a 24-inch — are needed for storage purposes in each center, the additional counter can be obtained by using part of an adjacent counter.

The two 18-inch base cabinets are identical. The 24-inch cabinets differ in the number of drawers — one has four drawers for utensils; the other, an apron drawer and two drawers for utensils. Each mix center has one 24-inch wall cabinet.



Cabinets for Each Mix Center

One *24″ wall cabinet* with adjustable shelving.

One 18″ *base cabinet* with:

Shallow drawer for small utensils
Storage for flour and sugar
File drawer for large utensils

One *24″ base cabinet* with:

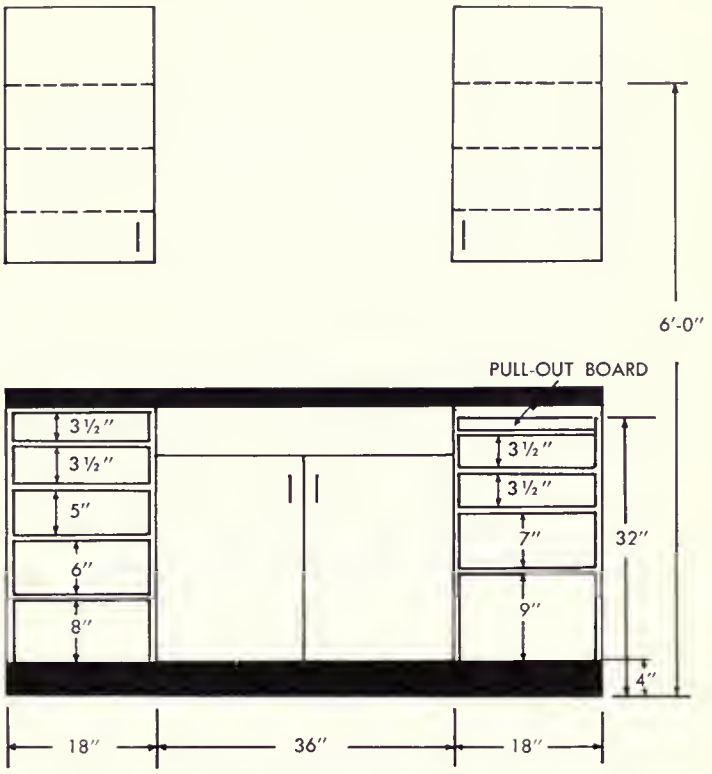
Pull-out counter, 30″ from floor
Drawers — one 24″ cabinet should have four drawers; the other, an apron drawer plus two drawers for utensils.

Items Stored in Each Mix Center

Set of mixing bowls
2 sets of 4 measuring cups
Glass measuring cup, ½ pint
Paring knife
Spatula, 4″
Spatula, 7″
2 tablespoons
2 teaspoons
2 sets measuring spoons
Casserole
Layer cake pan
Loaf cake pan, glass
Muffin pan
Biscuit cutter
Rotary egg beater
Pressure pan
Toothpicks or cake tester
4 custard cups
Lemon reamer
Grater
Fork
Sifter
Wooden spoon
Scoops
Rubber scraper
Cookie sheet
Cookie cutter
Pie tin
Bread pan
Rolling pin
Pastry canvas
Pastry blender
Wax paper

Sink Center

The sink center consists of a double-bowl sink mounted in a 36-inch base cabinet, two 18-inch base cabinets for storage, and two 18-inch wall cabinets. Towel rods (pull-out type) and disposal facilities for paper towels and garbage should be provided in the cabinet beneath the sink bowls. Utensils stored at the sink center are those first used with water.



Equipment and Cabinets for Sink Center

One *double-bowl sink mounted in a 36" base cabinet.*

One *18" base cabinet,* at right of the sink, with:
Pull-out counter 32" from floor
Four drawers

One *18" base cabinet,* at left of the sink, with:
Five drawers

Two *18" wall cabinets* installed over the right- and left-hand base cabinets.

Items Stored at the Sink Center

Cleaning supplies
Garbage can and liners
Sink strainer

Tablespoon
Slicing knife
Scissors
Vegetable peeler
Bottle/can opener
Rubber scraper
Glass measuring cup, 1 pint

Dish towels
Dishcloths
Paper towels
Refrigerator bags
Double boiler

Vegetable brush
Serving trays
Cutting boards

2 paring knives
Strainer
Double boiler
2 saucepans
Set of 3 mixing bowls

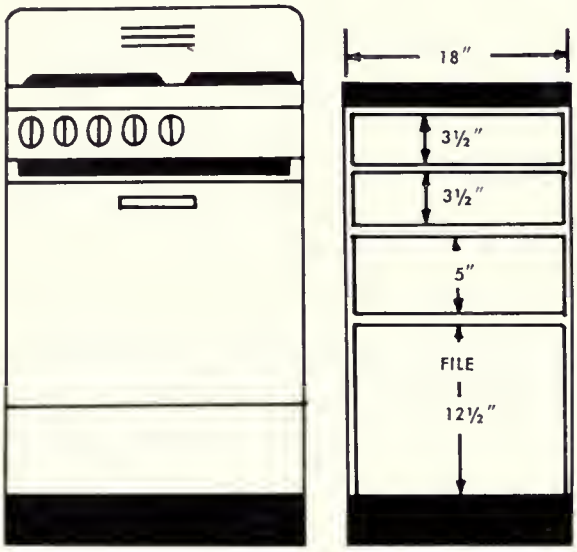
Place mats
Napkins
Silverware
Sauce pan

Glassware
Chinaware

Coffee maker

Range Center

A four-burner range and one 18-inch base cabinet are specified for the range center. A four-burner counter-top cooking unit can be substituted for the range. If this is done, the oven, which is separate from the counter unit, may be installed in the main part of the foods laboratory instead of in the unit kitchen. The utensils stored at the range center are those first used with heat.



Appliance and Cabinet for Range Center

Four-burner range (or counter-top cooking unit)

One *18" base cabinet* with four drawers:

- Two *shallow, divided drawers* for small utensils and seasonings
- One *medium drawer*
- One *deep file drawer*

Items Stored at the Range Center

Glass measuring cup, ½ pint
Wide spatula
Meat fork
Case fork
Wooden spoon
2 teaspoons
Tongs

Lids
Saucepan, 1½ pint
Chicken fryer

2 tablespoons
Potato masher
Pan holders
Matches
Salt and pepper shakers
Toothpicks or cake tester

Skillet
2 cake-cooling racks

SPACE AND ARRANGEMENT STANDARDS FOR WORK CENTERS

Motion-time records showed that the three classroom kitchen units tested — L, U, and box-U — are equally efficient for use by students.

The actual shape of the kitchen has little appreciable effect on efficiency when these standards are met:

1) *The various work centers should be complete in themselves.* (They should contain the necessary utensils and supplies, stored so that they are easily available.)
2) *Two mix centers should be included.*
3) *The distances between the major work points — mix center, sink, and range — should be kept to a minimum* after storage and counter requirements are fulfilled.
4) *The two mix centers should be as close to the sink center as possible.* (The largest number of trips within the unit kitchen was shown to be between the mix centers and the sink.)
5) *The two mix centers should not be adjacent.* (They should be positioned as shown in the arrangement sequences on pages 14, 15, and 16.)

From the teacher's standpoint, the U and box-U units (with wall cabinets and the sink in the central position) are more easily supervised. The teacher can observe the work of all students at the mix and range centers merely by walking past a series of such units. The teacher must enter the L kitchen in order to observe the work of students at one of the mix centers.

This study did not include one-wall, corridor, or irregular kitchen arrangements, but the same principles of storage, duplication, distances, and sequence would apply.

Passageway Widths

The minimum width of the passageway between the fronts of work cabinets is set at 60 inches (5 feet). This width allows enough space for one person to walk between two students who are working at opposite centers. In the U and box-U plans (pages 14 and 16) passageway widths of 72 inches (6 feet) are specified in order that the needed counter at the sink can be included.

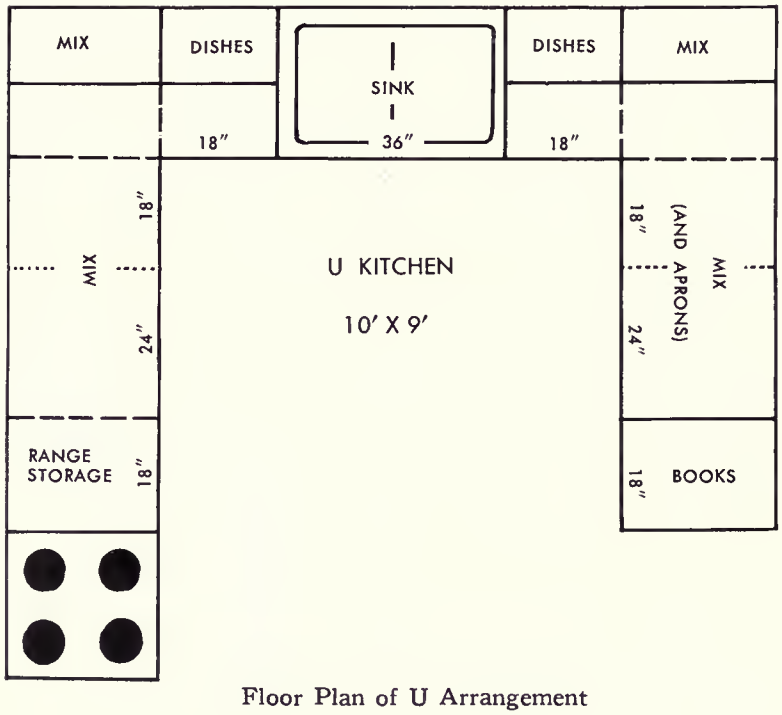
Over-all Dimensions

The floor area required for a unit kitchen depends on its shape. Dimensions of the various work centers are shown on pages 14, 15, and 16.

A minimum distance of 5 feet between the fronts of opposite cabinets is needed.

U-SHAPED UNIT KITCHEN

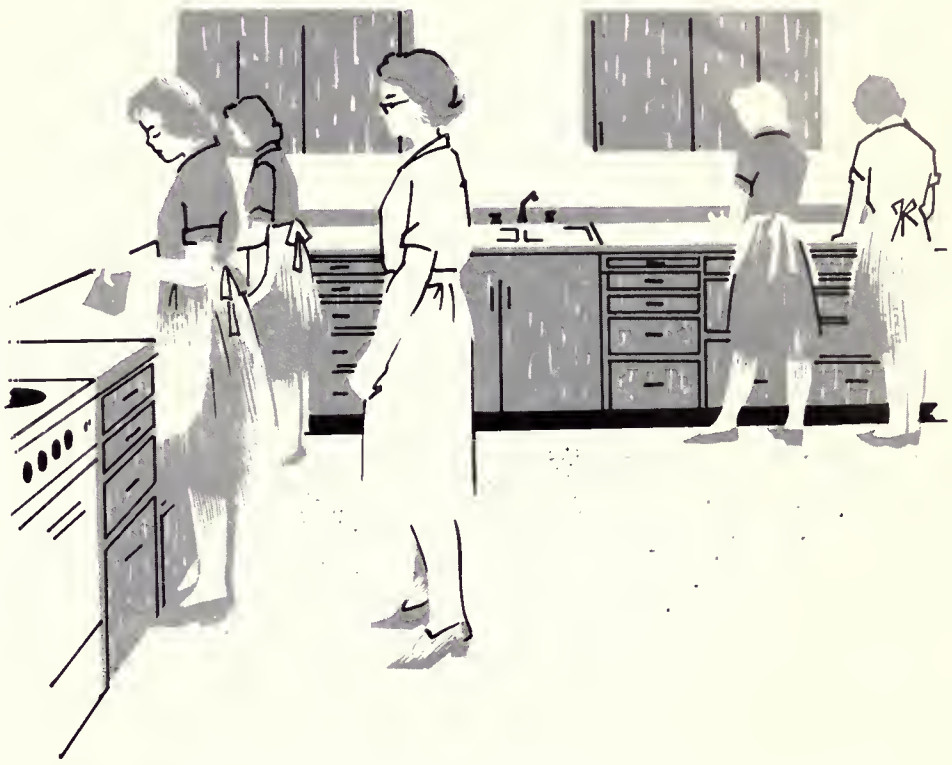
The U arrangement is the most compact, has the maximum of continuous counters, and permits the teacher to observe the work of all students at the mix and range centers as she walks by a series of such unit kitchens without entering them.

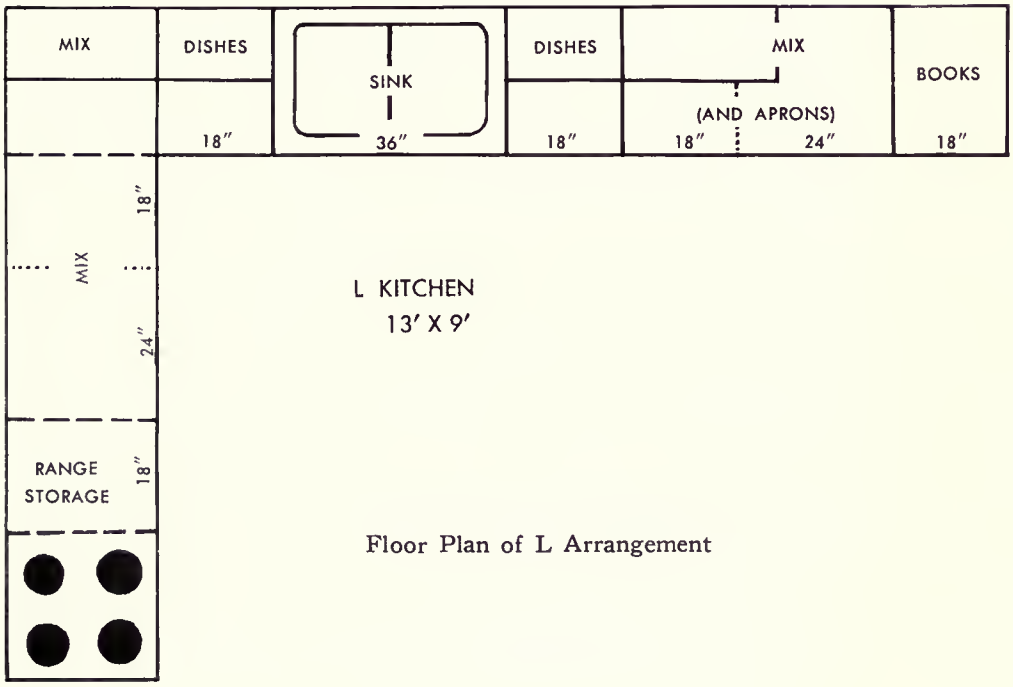


Floor Plan of U Arrangement

L-SHAPED UNIT KITCHEN

The L-shaped layout is not as compact as the U arrangement. The teacher must enter the L in order to observe students who are working at one of the mix centers.



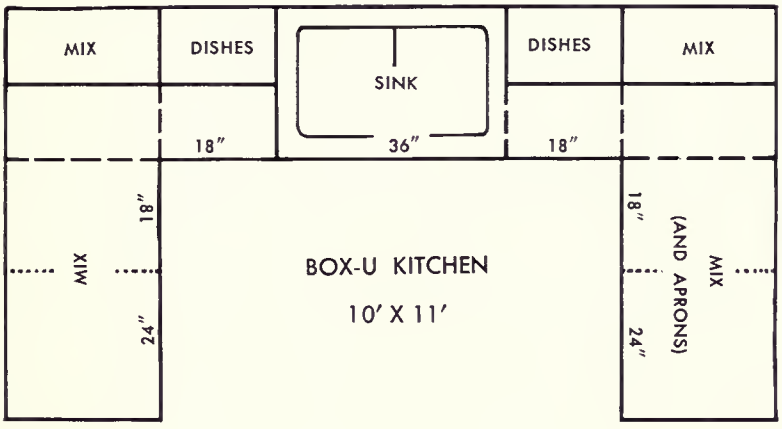


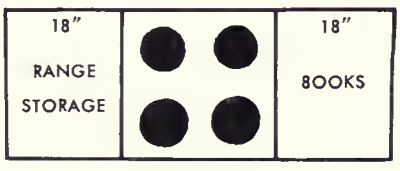
L KITCHEN
13′ X 9′

Floor Plan of L Arrangement

BOX-U UNIT KITCHEN

The box-U arrangement was designed for this unit kitchen research project in order to make the range equally accessible to both of the mix centers and to reduce cross-traffic. The box-U, like the U-shaped unit, makes possible convenient supervision of the students.





Floor Plan of the Box-U Arrangement

SUMMARY

To help students learn good management techniques in food preparation, the classroom unit kitchen must be planned for functional storage and use of all equipment and supplies.

The unit kitchen should be designed to permit as many as four students to work efficiently at one time without undue congestion, interference, or cross-traffic.

Storage

Utensils, tableware, linens, cleaning supplies, and basic food items should be stored within the unit kitchen. To relieve confusion, it is suggested that refrigerated foods and special ingredients for the day's classroom assignment be placed on trays on the counters of each unit kitchen as required, rather than at the storage and distributing center in the main area of the foods laboratory.

All equipment and supplies kept in each unit kitchen should be stored nearest the place where they are likely to be used first. This principle of "storage at the place of first use" is highly important in saving time and steps.

All items should be stored so that they are easy to see, reach, and grasp.

Assignment of each piece of equipment to an exact storage spot by labels within drawers and cabinets is essential if items are to be replaced correctly and rapidly.

Duplication of the most frequently used items eliminates needless waiting and unnecessary steps on the part of students.

Work Centers

If two mix centers are provided instead of one, it is possible to eliminate much of the confusion that results when four students try to work at one counter and storage area at the same time.

Essential elements of each unit kitchen are two mix centers, one sink center with double-bowl sink, one range center with a four-burner range, and one special storage cabinet for students' books and personal belongings.

Factory-made cabinets are suitable for use in unit kitchens if they are of recommended dimensions and have the specified pull-out counters and drawers.

Pull-out counters in base cabinets of the mix and sink centers enable short students to work without fatigue. The pull-out counter in the mix center should be 30 inches from the floor; in the sink center, 32 inches.

A minimum of 30 inches of counter space per person is recommended where students are to work side by side. At the mix center, where two students work at the same time, the minimum therefore is 60 inches.

Arrangement of Unit Kitchens

The recommended minimum width of the passageway between the fronts of cabinets is 60 inches.

The actual shape of the kitchen unit — U, L, or box-U — has little effect on the efficiency of students if: 1) the various work centers contain the necessary equipment, utensils, and supplies, and all items are stored so that they are easily available; 2) two mix centers are included; 3) the distances between the three major work points — mix center, sink, and range — are kept to a minimum; 4) the two mix centers are as near the sink as possible; and 5) the two mix centers are not adjacent.

The U and box-U kitchens are more convenient to supervise than the L kitchen.

The box-U kitchen has an additional advantage over the other arrangements because the range is equally accessible to each of the two mix centers.

RECOMMENDATIONS

Maintaining a functional storage plan for the unit kitchen is a continuous process. Both teacher and student need to evaluate periodically the efficiency of the storage facilities and the arrangement of the unit. Changes may be advisable because of new equipment or new food products and processes.

Recommendations for Further Research

The study reported in this publication was limited to kitchen units within the foods laboratory. Further research concerned with the foods laboratory itself is needed. For example, more information is desirable on the following factors:

1) The relationship of the foods laboratory to the homemaking teaching area, with particular emphasis on arrangement and flexibility of use.
2) The relationship of the individual kitchen units to each other and to the main area of the foods laboratory.
3) Meal-serving facilities and the relationship of these to the kitchen units.
4) Major equipment needed — for instance, the number of refrigerators — and the location of these items in the foods laboratory.
5) The arrangement, size, and location of the storage and distributing center for, first, refrigerated and special food items, and, second, one-of-a-kind equipment used only occasionally and therefore not included within the units — for example, a food grinder.
6) Planning factors affecting teacher-convenience in supervising the work of students within the units.

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